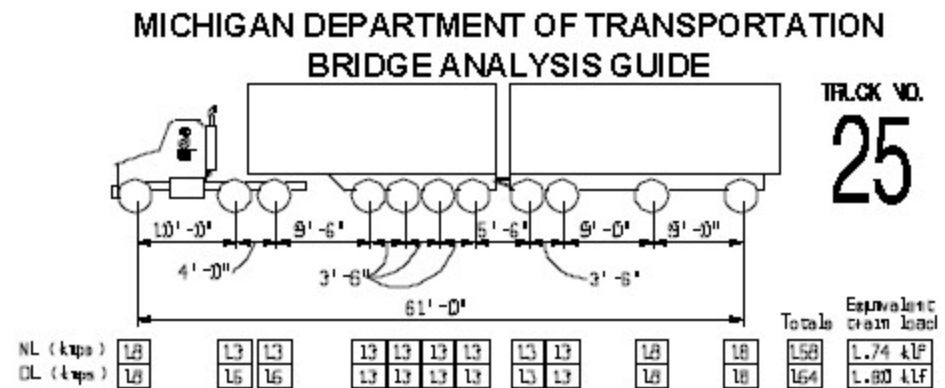
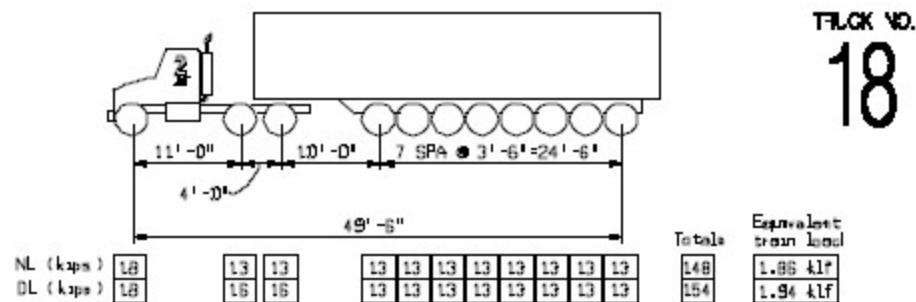


Live Loading on Bridges in Michigan

Roger Till, P.E., Rebecca Curtis, P.E.,
Michigan Department of Transportation



Legal Truck Load



“Grandfather clause” in the Federal Aid Act of 1956

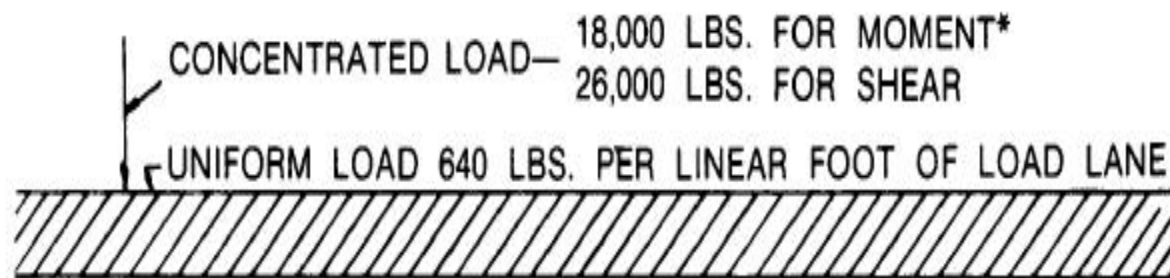
Legal Truck Load



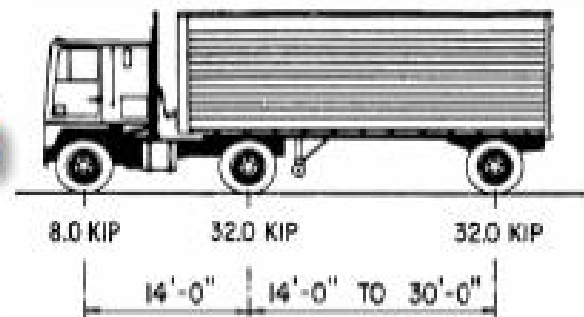
CMDOT

Design Live Load Prior to 1973

HS20



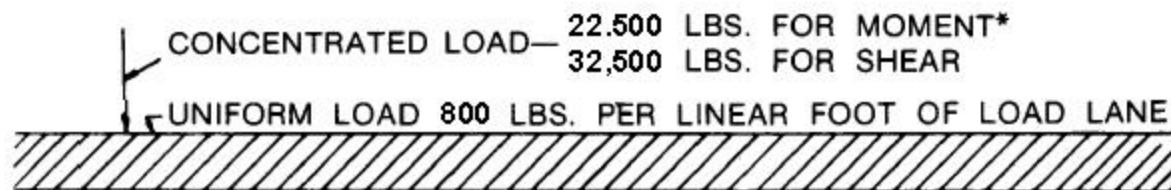
HS20



CMDOT

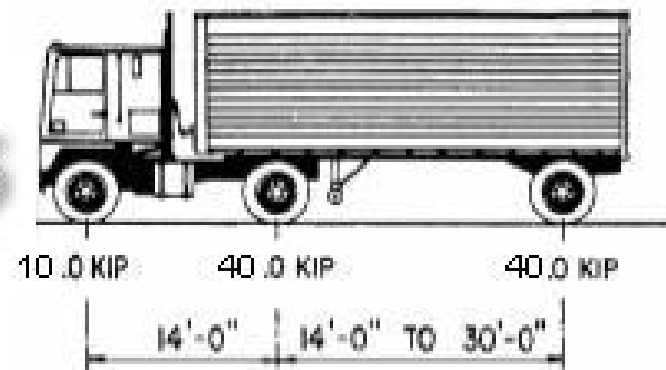
Design Live Load After 1978

HS25



125% HS20

HS25



MDOT

Bridge Loading



Research Report RC-1413, July 2002

Investigation of the Adequacy of Current Bridge Design Loads¹

¹van de Lindt, J.W. (MTU), Fu, G. (WSU)

MMDOT

Used truck data from bridge WIM studies done in SE Michigan


Projected data to 75 years in future

Reliability method used for analysis

HS25 loading may not be adequate



MMDOT

The background of the slide is a dark, low-contrast photograph of a multi-span concrete highway bridge. The bridge has several large arches and is supported by numerous piers. A faint, large watermark of the word "MIDOT" is visible in the lower right portion of the image. The text is overlaid on this background in a bright green color.

Change from Standard Specifications for Highway Bridges

to

Load and Resistance Factor Design (LRFD)

Must use AASHTO LRFD
Bridge Design code starting in
October 2007

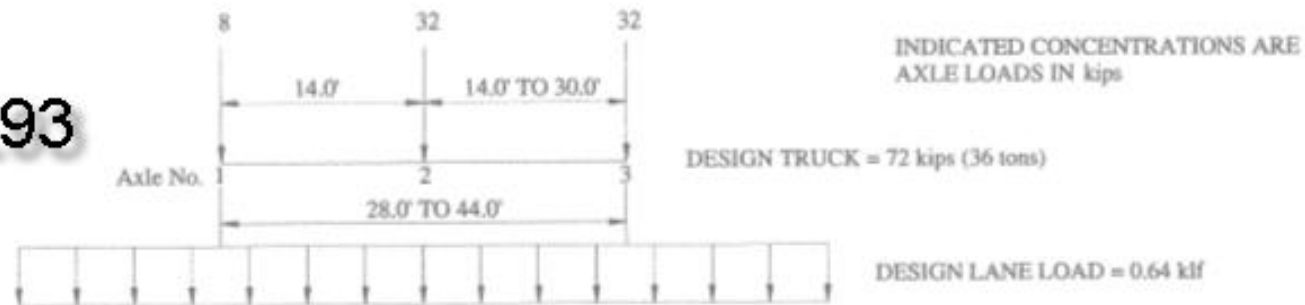
What load should be used?



LRFD Bridge code

HL93 live loading

HL93



HL93



Is it adequate?

CMDOT

Research Report RC-1466, August 2006

LRFD Load Calibration for Trunkline Bridges²

²Fu, G. (WSU), van de Lindt, J.W. (CSU),

MDOT

Used truck data from bridge WIM studies done in SE Michigan

Used truck data from WIM sites in Michigan

Over 100 million trucks used for analysis

Projected data to 75 years in future

Reliability method used for analysis

HL93 loading adequate for most of Michigan

Overloads excluded from analysis



Research Report R-1511, April 2008

Recommendations for Michigan Specific LRFD and LRFR Procedures³

³Curtis, R., Till, R. (MDOT)



Overloads are trucks that may operate with a permit, and can be nearly twice as heavy as Legal Loads

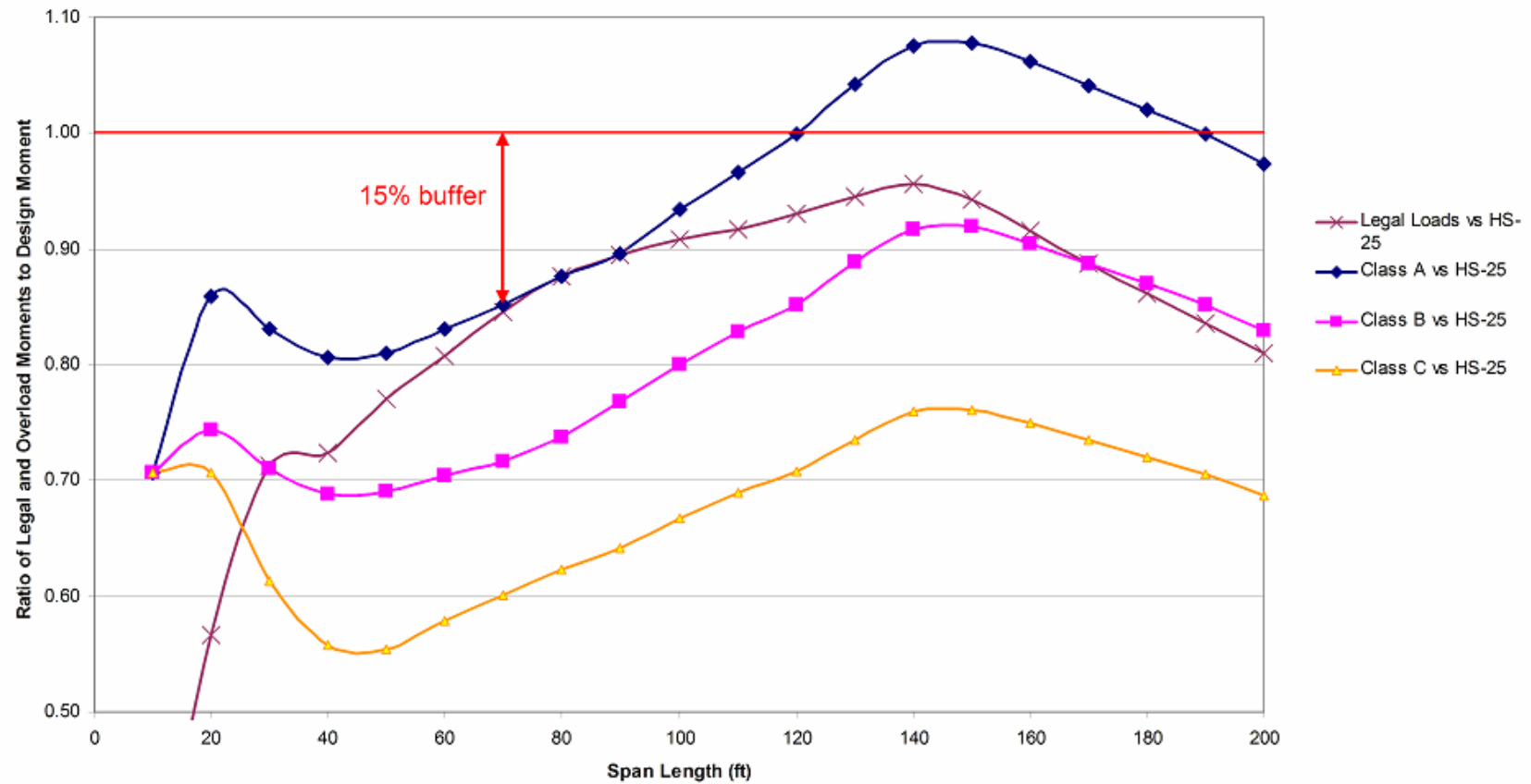
LRFR Code changes the procedure for analyzing Overloads

30,000 permits issued each year

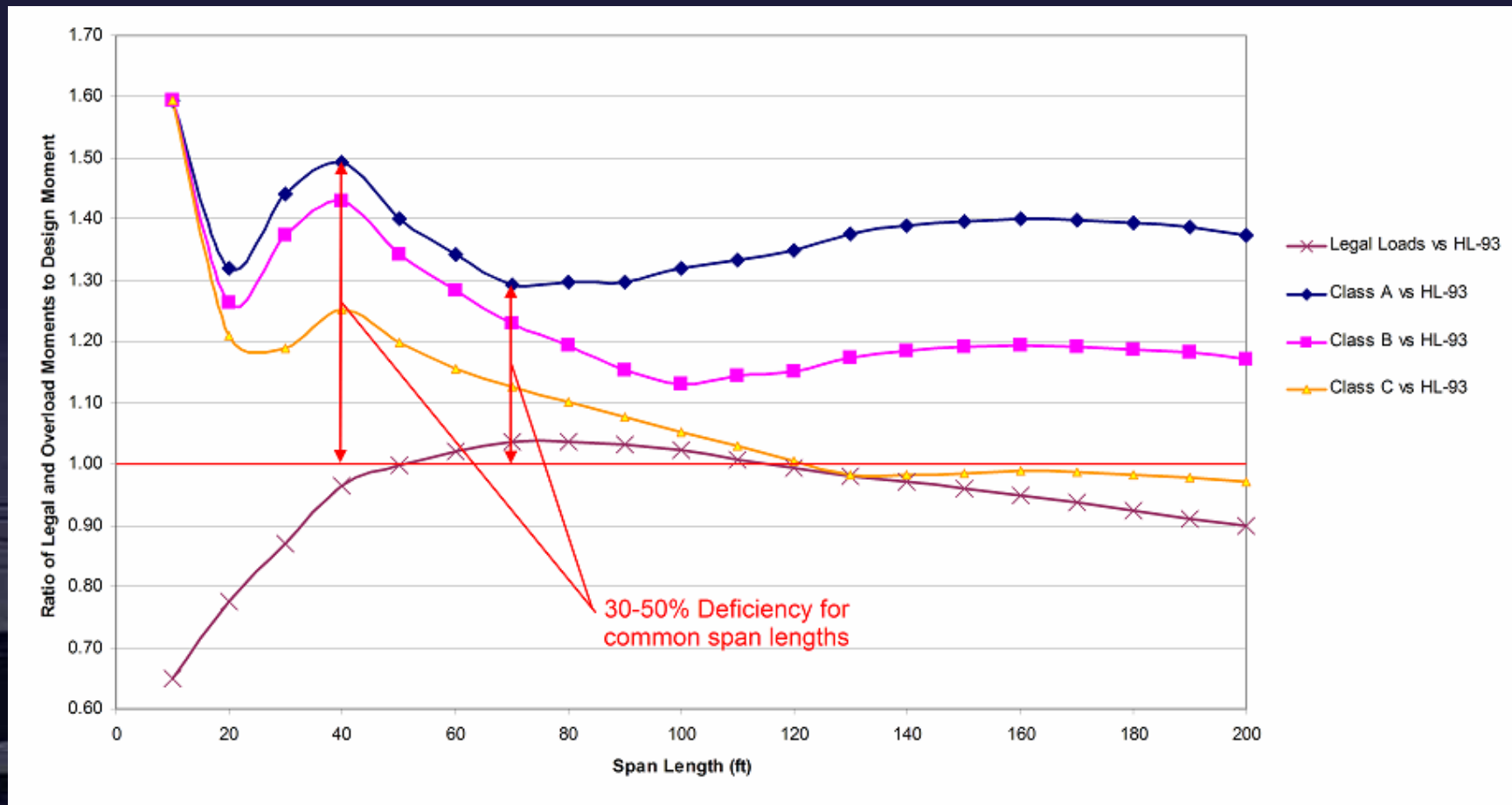


MDOT

MI Legal/Overload vs HS-25 (LFR)



MI Legal/Overload vs HL-93 (LRFR)



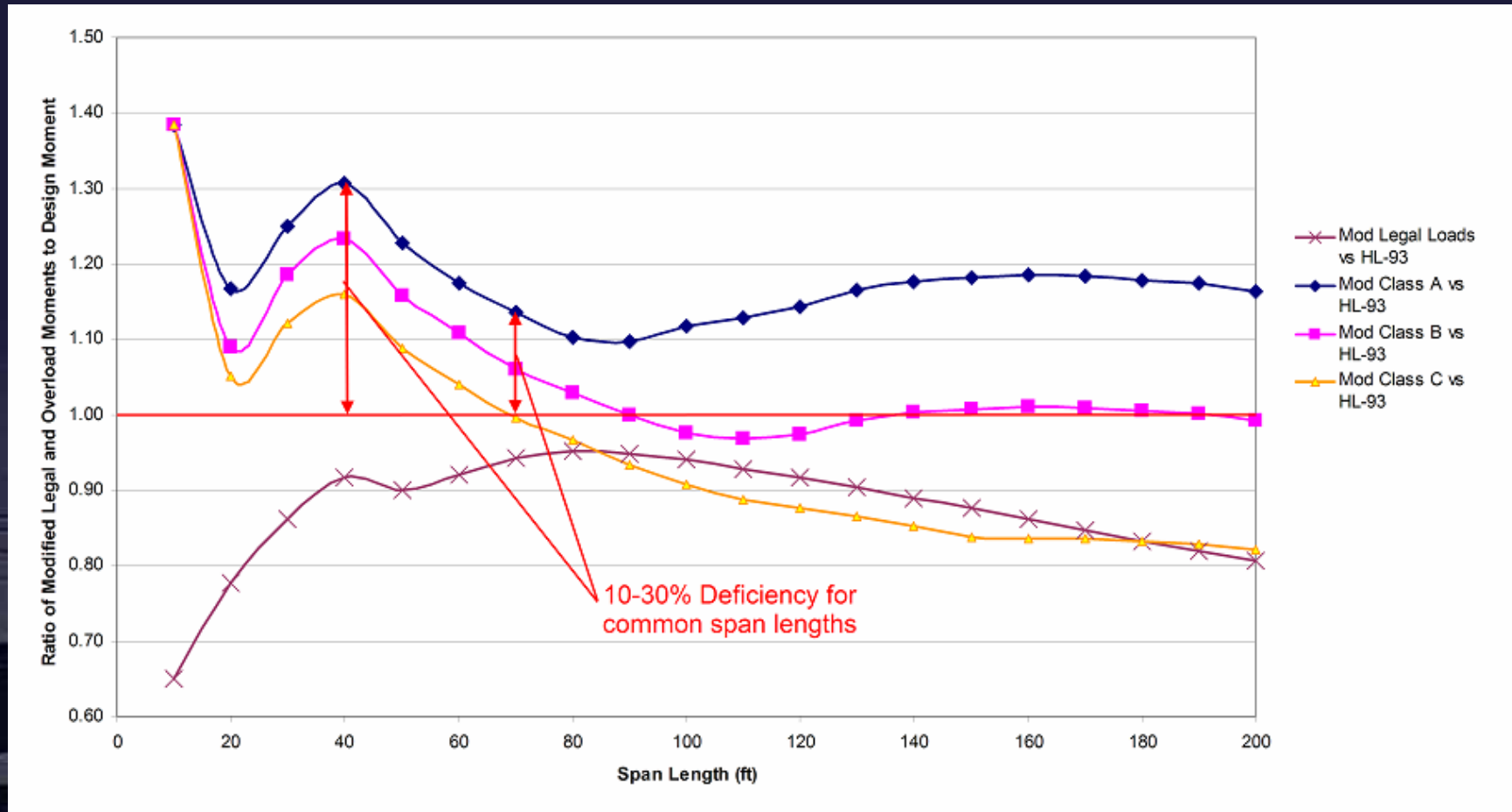
Estimated new bridge construction cost increase to meet LRFR criteria and maintain Overload Class: 9%

WIM data from RC-1413 and RC-1466 used to develop Michigan specific Load Factors

Projected data to 5 years in future

MMDOT

MI Legal/Overload-MOD vs HL-93



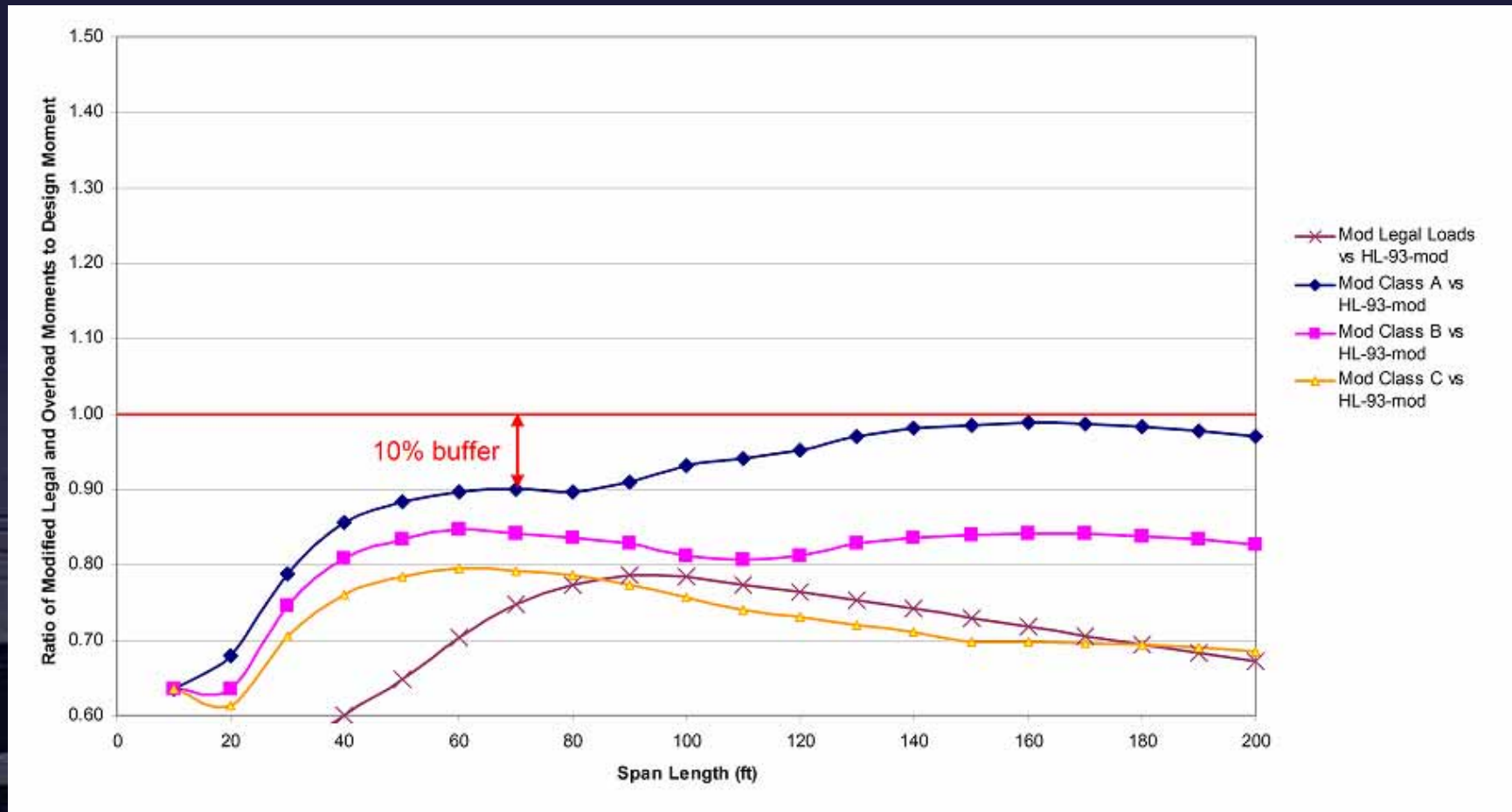
Modified Design Loads

Add axle from Overload Truck

Increase HL93 Load by factor of 1.2

All Overload Trucks are now less than Design with a similar buffer to historic (1978-2007) conditions

MI Legal/Overload-MOD vs HL-93-MOD



Cost savings from Load Factor
Modifications developed in R-1511
on new bridge construction projects:
5%

Final estimated new bridge
construction cost increase for
proposed method: 4%



MDOT



TANKS



Questions?

Roger Till, P.E., Rebecca Curtis, P.E.,
Michigan Department of Transportation

MMDOT